TEAC®

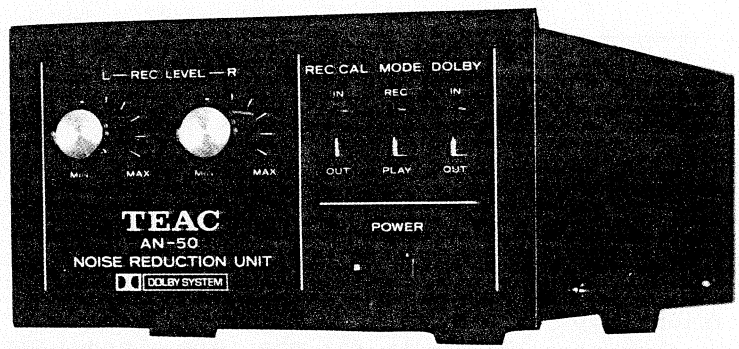
AN-50

NOISE REDUCTION UNIT
SERVICE MANUAL

The TEAC AN-50 is a DOLBY B system noise reduction unit primarily designed for use with TEAC cassette decks. One Dolby circuit is employed for both recording and playback, operating mode is selected by a changeover switch. Unit operation and service is extremely simple and easy.

This manual describes the adjustment, inspection and calibration procedures to be accomplished by service engineers. Explanations which duplicate those in the owners instruction manual, and detailed circuit theory operation have been omitted. Refer to the owners manual for complete operating instructions.

In the event difficulties are encountered during complex adjustment or repair, contact the nearest TEAC dealer or field office.



TEAC CORPORATION

SALES OFFICE: SHINJUKU BUILDING, 1-8-1, NISHI-SHINJUKU, TOKYO

TEAC HONGKONG LIMITED: MAIN OFFICE — ROOM NO.1105, MELBOURNE PLAZA, 33 QUEE'S ROAD C., HONG KONG

EUROPEAN DISTRIBUTOR: TEAC EUROPE N.V., KABELWEG 45-47, AMSTERDAM-W. 2, HOLLAND

U.S. DISTRIBUTOR: TEAC CORPORATION OF AMERICA, 7733 TELEGRAPH ROAD, MONTEBELLO, CALIFORNIA 90640, U.S.A.

MA0500E100

SERVICE DATA

FREQUENCY RESPONSE:	20Hz∿12kHz ±2dB		
INCREASED SN RATIO:	10dB or more at 10kHz 5dB or more at 1kHz Overall 6dB or more ("B" weighted measurement)		
INPUT SENSITIVITY/IMPEDANCE:	LINE OUT	High	0dB/10kΩ
		Low	-8dB/10kΩ
	INPUT		-18dB/30kΩ
OUTPUT LOAD/ OUTPUT IMPEDANCE:	LINE IN	-8dB/30kΩ or more	
	OUTPUT	-2.5dB/10kΩ or more	
DISTORTION FACTOR:	Below 0.5%		
MPX FILTER:	19kHz		
CALIBRATION SIGNAL:	400Hz		
CHANNEL SEPARATION:	50dB or better		
OVERALL DIMENSIONS:	3.4" × 5.5" × 8.9"		
WEIGHT:	2.7 lbs		

Performance data and specifications subject to change with future modifications.

PRECAUTIONS

Procedures may not specify between left and right channels. In such cases assume the procedures are to be applied first to the left channel (L) and repeated for the right (R) channel. Controls not specifically mentioned may be set at any position.

0dB = 0.775 V

Double designations apply to left and right channels. For example VR-101/201 indicates that VR-101 is for the left channel and VR-201 is for the right channel.

All controls interact with each other to some extent. Therefore carry out all adjustment procedures in the sequence shown in the manual. Do not proceed to the next step unless all prescribed values have been obtained. Repeat procedures as necessary to obtain the prescribed values.

When making frequency response measurements, exercise particular caution as signal levels are extremely critical.

TEST EQUIPMENT REQUIRED

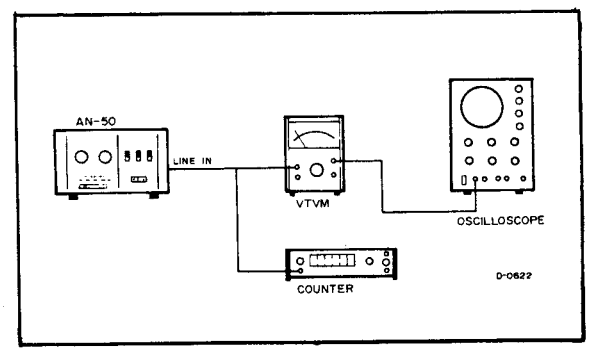
AF OSCILLATOR:	50Hz to 100kHz
ATTENUATOR:	0 to 90dB in 0.5dB steps
AC VTVM:	Input impedance 100kΩ or higher
RESISTOR:	4.7kΩ/1W
CORE TUNING WAND:	Non inductive
MISC:	General hand tools
FILTER:	"B" weighted network

1. CALIBRATION (INTERNAL) SIGNAL OSCILLATOR

This 400 Hz oscillator provides test signals for the calibration of the recording level of the tape and tape deck.

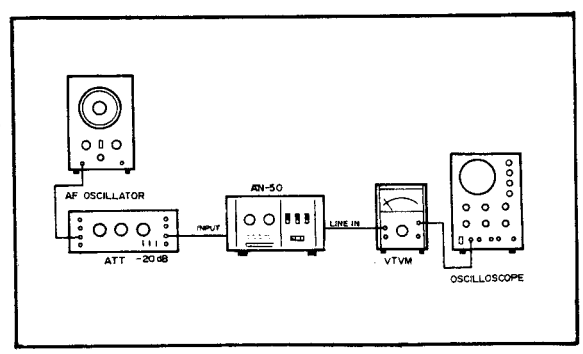
- Set the MODE switch to REC, REC CAL switch to IN.
- Connect the VTVM to LINE OUT L, VTVM should indicate -7 ±0.2 dB.
- If reading is not within specified limits adjust to correct value with VR-401.

The test oscillator signal is passed to external terminals through the DOLBY circuit. After completing the record characteristic tests and adjustments, recheck and readjust (if necessary) the test oscillator signal level.



2. RECORD CHARACTERISTIC ADJUSTMENT

Since a single circuit accomplishes both the record and playback functions, if the circuit is properly adjusted for one function (i.e. recording) it is also properly adjusted for the remaining function. In the following section the recording characteristic adjustment procedures are outlined.



SPECIFIED DOLBY LEVEL -RECORD-

- Connect equipment as shown in diagram.
- Turn REC LEVEL L and R controls fully clockwise.
- Set the MODE switch to REC, the REC CAL switch to OUT, set the DOLBY switch to IN, and the LEVEL switch on rear of unit to HIGH.
- Apply a 100Hz/0dB signal to INPUT.
- Adjust the output level of the AF oscillator to obtain a reading at LINE IN jack of -7 dB.
- Signal generator output at this point should be -20 dB ±2 dB.

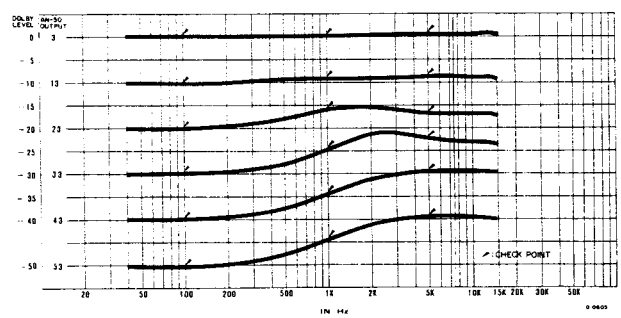
MPX FILTER ADJUSTMENT

When an FM broadcast is used as a program source the multiplex filter prevents the pilot signal from interfering with the DOLBY circuit operation.

- After setting the specified DOLBY level, apply a 19 kHz (±1%) signal.
- Bring the cores of L-102/202 to the full up position (Counterclockwise).
- Adjust L-101/201 so that signal output level will be below -25 dB.
- Apply a 38 kHz signal and check to insure that the output level is below -17 dB. The 19 kHz signal should be attenuated at least 18 dB below the specified DOLBY level.

RECORD FREQUENCY RESPONSE

- Apply a 1 kHz signal 20 dB below specified DOLBY level.
- Output level should be -22 ±0.2 dB. Adjust to required level with VR-101/201.
- Apply a 10 kHz signal 40 dB below specified DOLBY level.
- Output level should be -37 ±0.2 dB. Adjust to required level with VR-102/202.



RECORD FREQ. CHARACTERISTIC CURVE

CAUTION

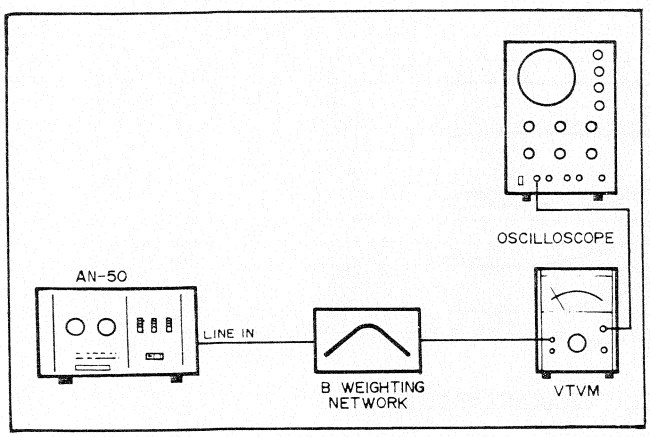
VR-101/201 and VR-102/202 will interact with each other, coordinate their adjustments until the specified values are obtained.

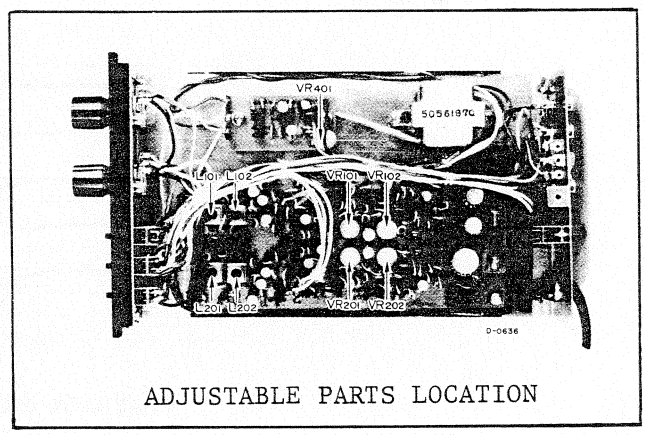
3. RECORD SN RATIO CHECK

- Connect as shown in diagram.
- Place REC CAL switch to OFF, DOLBY switch to IN position.
- Place the REC LEVEL controls fully clockwise, set the MODE switch to REC.
- Connect a 4.7 kΩ resistor across the input terminal.
- The measured noise level should be less than -62 dB.

> NOTE
>
> The SN ratio is 55 dB with respect to the specified DOLBY level (-7 dB).

- After completing the record SN check, perform a check of the playback SN ratio.



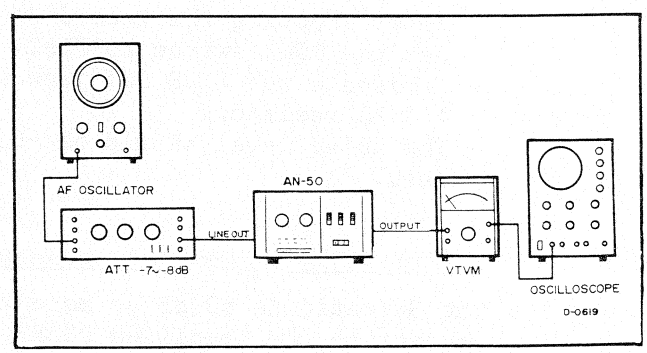


ADJUSTABLE PARTS LOCATION

4. PLAYBACK CHARACTERISTICS TEST

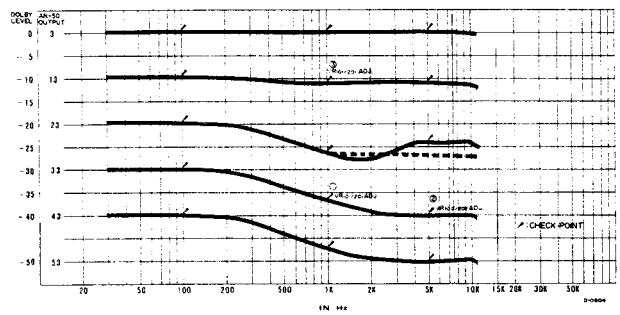
The playback frequency response will comply with the specifications provided that the record frequency response has been properly adjusted.

- Connect test equipment as shown in the diagram.
- Set LEVEL switch to LOW position, set REC CAL and DOLBY switches to IN, mode switch to PLAY.
- Check the calibration output signal level.
  Reading should be -3 dB ±1 dB.



SETTING DOLBY REFERENCE LEVEL -PLAYBACK-

- Set the REC CAL switch to OUT.
- Apply a 100Hz/0dB signal to TO TAPE DECK LINE OUT jack.
- Adjust oscillator signal level to obtain a signal of -3 dB at the OUTPUT jack.
- Input signal level should be between -7 and -8 dB. This is the DOLBY reference level.
- Change the signal generator frequency to 13 kHz, the output signal level should be 0 ±3 dB.
- Apply a 1 kHz signal 20 dB below specified DOLBY level. Output signal level should be -25 ±1 dB.
- Apply a 10 kHz signal 40 dB below specified DOLBY level. Output signal level should be -50 ±2 dB.
- Apply a signal at the specified DOLBY level, move the level switch between the HIGH and LOW positions, output level difference should be 7 ±0.5 dB. (Output level with respect to specified DOLBY level -3 dB).



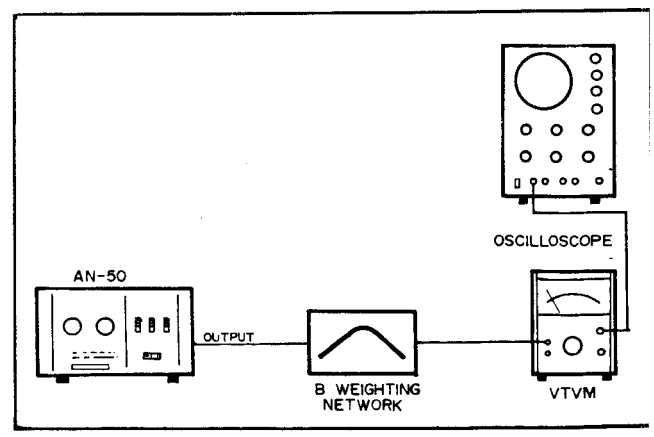
PLAYBACK FREQ. CHARACTERISTIC

DOLBY CIRCUIT OUT

- Place the DOLBY switch to OUT, check to see that DOLBY circuit is disabled, frequency response of the unit should be essentially flat within the specified frequency range.

5. PLAYBACK SN RATIO CHECK

- After checking the record SN ratio, set the MODE switch to PLAY.
- Terminate the LINE OUT jack with a 4.7 kΩ resistor.
- The noise level should be -63 dB or less.



NOTE

The SN ratio is 60 dB or more with respect to the specified DOLBY level (-3 dB).

INCREASED SN RATIO CHECK

Measurement of the SN ratio is described in foregoing sections of this manual. If the previous adjustments have been correctly accomplished the specified improvement in SN ratio (10 dB at 10 kHz) will be obtained.

Matching the tape deck with the AN-50:
In order to operate properly the tape deck used with the AN-50 must be matched in input level and impedance. The deck must have an output level control capable of varying the output audio level and most important, the record and playback frequency response of the deck should be essentially flat.

SETTING THE DOLBY REFERENCE LEVEL

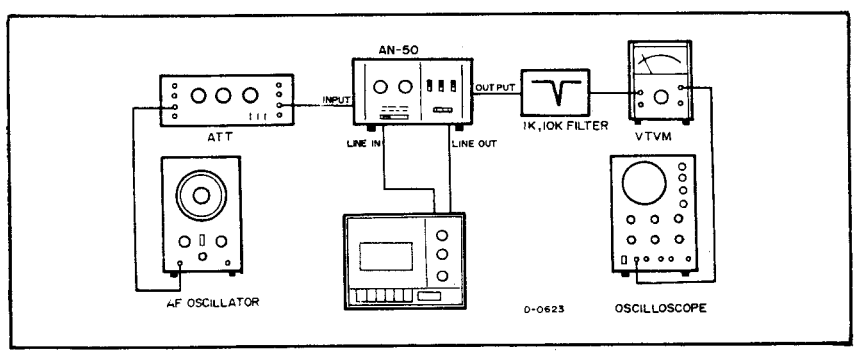
- Connect equipment as shown in the diagram and make the following settings.

REC LEVEL	Fully clockwise
DOLBY switch	IN
LEVEL switch	LOW

- Load the test tape MTT-112B in the deck.
- Set the REC CAL switch to OUT, and the MODE switch to PLAY.
- Play back the test tape and measure the output omitting the filter network shown.
- Adjust the tape deck output level controls to obtain an output playback level of -3 dB.

NOTE

Mark the position of the output level controls at this point. This DOLBY reference level should be at or near the 0 VU point on the tape decks VU meters. Mark the exact point on the VU meters with a felt tip pen.



SETTING THE RECORD LEVEL

- Load a record test tape MTT-501HF on the deck.
- Place tape deck in the record mode.
- Place the AN-50 MODE switch in the RECORD position.
- Place the REC CAL switch at IN position and record the DOLBY calibration signal. Adjust the tape deck input level control for an approximate reading of 0 VU.
- Rewind and play back the recorded portion. The objective is to have the playback level arrive at exactly the level previously marked on the VU meters. Several test recording may be required. Do not adjust the output level controls, adjust only the tape deck input level controls until the desired playback level is achieved. Once this is accomplished mark the position of the tape deck level controls. Control your recording level from this point forward with the REC LEVEL controls of the AN-50.

SN RATIO (NO SIGNAL) CHECK

- Load the deck with a test tape MTT-501HF which has been erased with a bulk eraser.
- Record a portion of the tape with no signal applied at the tape deck input.
- Rewind and play back the recorded portion.
- Measure the playback residual noise level through the 1 k and 10 kHz filters.

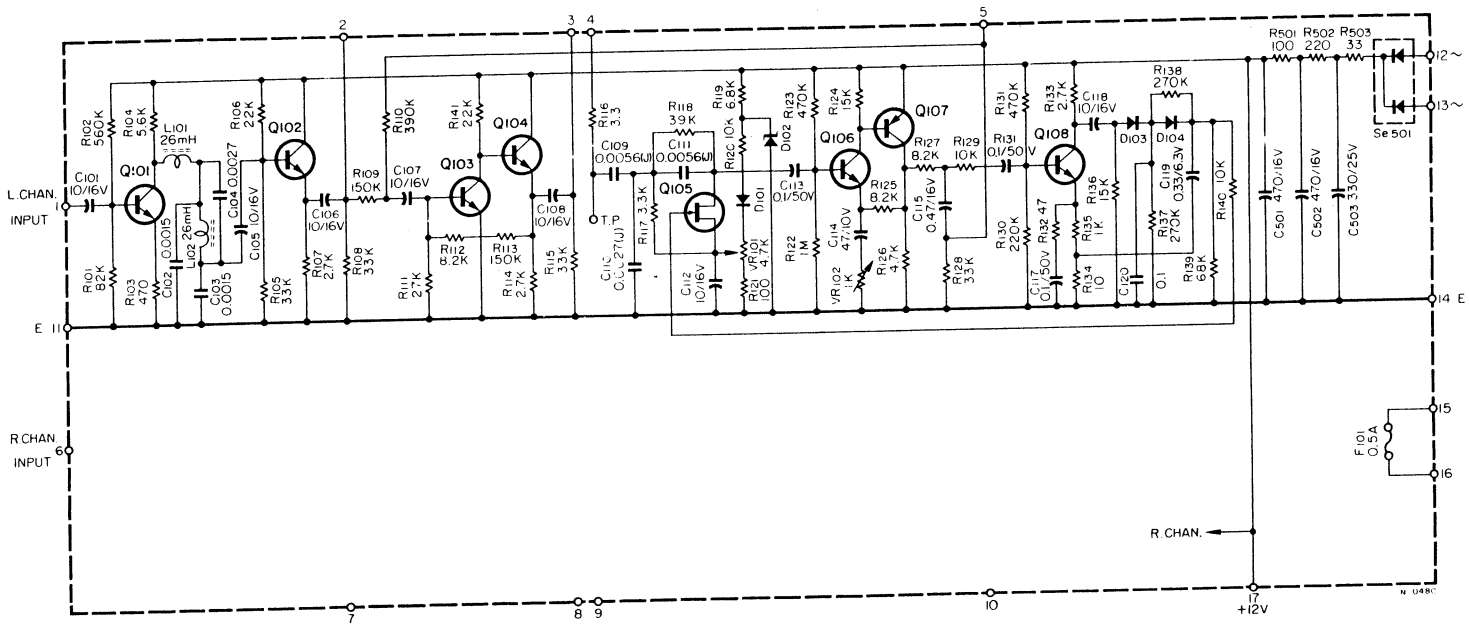
10 kHz filter	10 dB or more
1 kHz filter	5 dB or more
Overall	6 dB or more

- During playback alternate the DOLBY switch between IN and OUT positions to determine the noise level difference. This difference value is the SN ratio improvement.

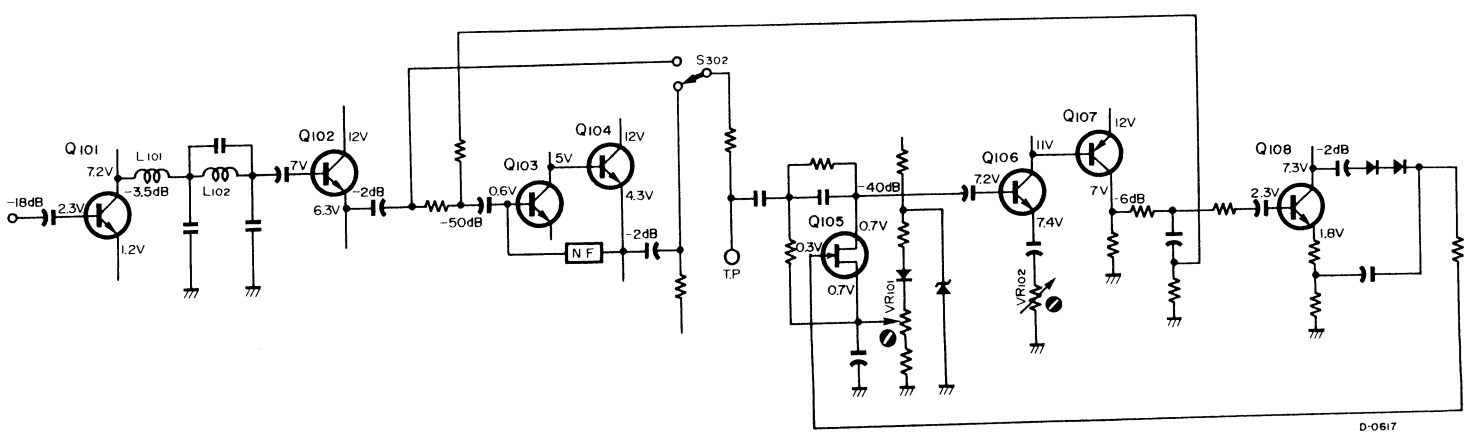
MEMO

AN-50

- SCHEMATIC DIAGRAM
- PRINTED CIRCUIT BOARD
- PARTS LIST



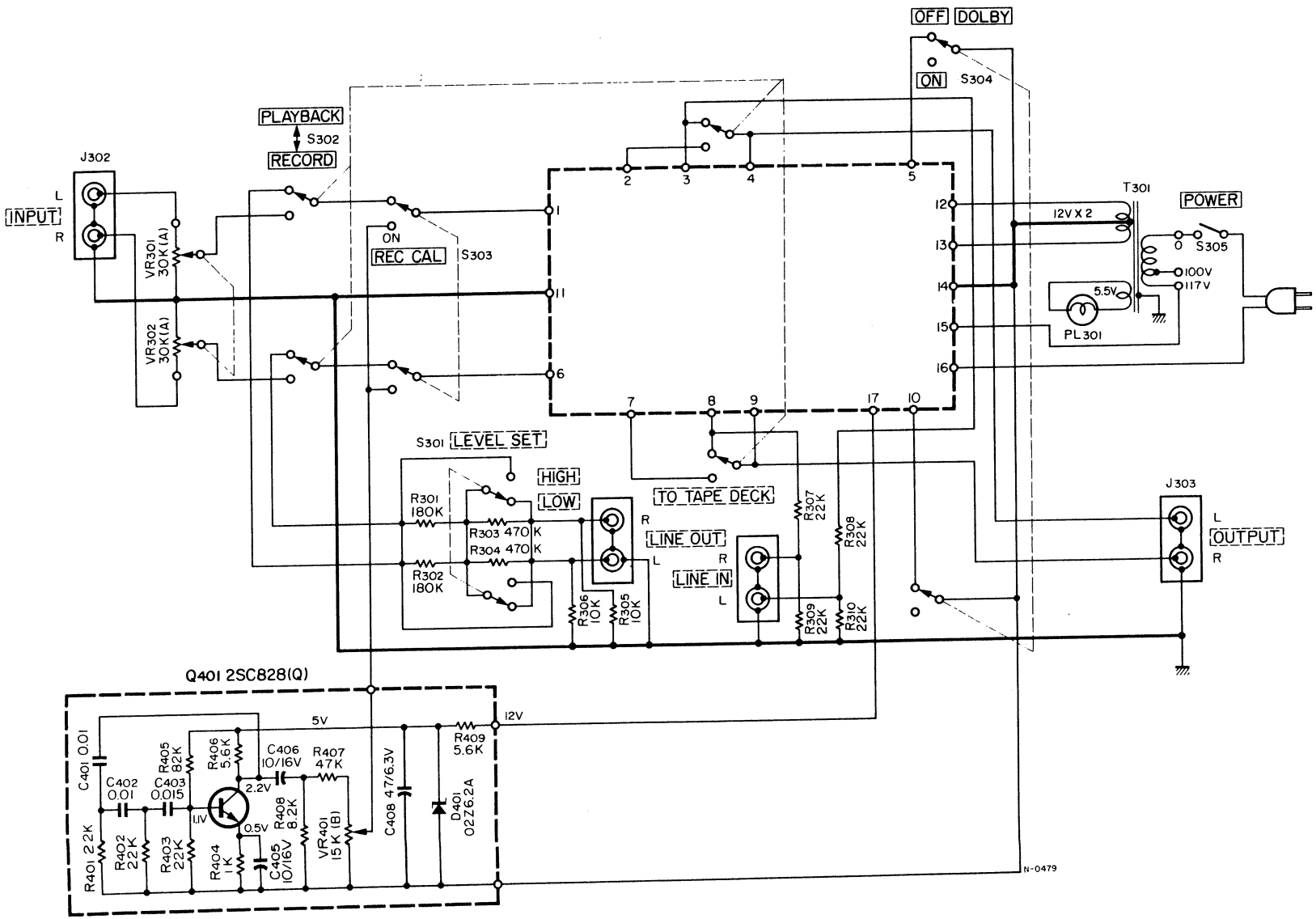
DOLBY B UNIT CURCUIT



LEVEL · DC VOLTAGE CHART

PC BOARD

Q101,201	2SC644 (S)	Q105,205	2SK30
Q102,202	2SC828 (Q)	Q106,206	2SC828 (Q)
Q103,203	2SC644(S)	Q107,207	2SA564 (Q)
Q104,204	2SC828(Q)	Q108,208	2SC828 (Q)



BLOCK DIAGRAM

PARTS LIST

CIRCUIT REF.NO.	TEAC PARTS NO.	DESCRIPTION	1st	2nd	3rd
	50117220	Front Panel			
	50287730	Mount Foot			
	50937960	Lamp Window			
	50253581	Knob B			
	50236060	Rear Panel A Assy			
	50236070	Rear Panel B Assy			
	50412143	Voltage Selector With Fuse			
	50444390	Slide Switch			
T301	50561970	Power Transformer			
S301	50444390	Slide Switch			
S302	50444390	Slide Switch			
S303	50444390	Slide Switch			
S305	50441110	Power Switch			
VR301/302	50533900	Potentiometer 30kΩ A			
PL301	50414310	Pilot Lamp, 6.3V			
R301/302	50518380	Carbon Resistor 180kΩ 1/4W R			
R303/304	50518370	Carbon Resistor 470kΩ 1/4W R			
R305/306	50513570	Carbon Resistor 10kΩ 1/4W R			
R307/308	50513580	Carbon Resistor 12kΩ 1/4W R			
R309/310	50513930	Carbon Resistor 22kΩ 1/4W R			

DOLBY UNIT

CIRCUIT REF.NO.	TEAC PARTS NO.	DESCRIPTION	1st	2nd	3rd
	50489751	PC Board Assy, Dolby Unit			
		SILICON TRANSISTORS			
Q101/201	50423590	2SC644(S)			
Q102/202	50423600	2SC828(Q)			
Q103/203	50423590	2SC644(S)			
Q104/204	50423600	2SC828(Q)			
Q105/205	50424770	FET 2SK30(R)			
Q106/206	50423600	2SC828(Q)			
Q107/207	50423790	2SA564(Q)			
Q108/208	50423600	2SC828(Q)			
		DIODES			
D101/201	50422130	IN60			
D102/202	50422350	Zener RD6A			
D103/203	50422130	IN60			
D104/204	50422330	M8513A-0			

PARTS LIST

CIRCUIT REF.NO.	TEAC PARTS NO.	DESCRIPTION	1st	2nd	3rd
		TRIMMER RESISTORS			
VR101/201	50533460	4.7kΩ (B)			
VR102/202	50533500	1kΩ (B)			
		COILS			
L101/201	50566606	Choke 26mH			
L102/202	50566606	Choke 26mH			
		CARBON RESISTORS			
		ALL RESISTORS IN OHM, 10% TOLERANCE, 1/4 WATT UNLESS OTHERWISE NOTED.			
R101/201	50515630	82k			
R102/202	50515750	560k			
R103/203	50515300	470			
R104/204	50515460	5.6k			
R105/205	50515570	33k			
R106/206	50515540	22k			
R107/207	50515400	2.7k			
R108/208	50515570	33k			
R109/209	50515660	150k			
R110/210	50515720	390k			
R111/211	50515560	27k			
R112/212	50515480	8.2k			
R113/213	50515660	150k			
R114/214	50515400	2.7k			
R115/215	50515570	33k			
R116/216	50515030	3.3			
R117/217	50515410	3.3k			
R118/218	50515430	39k			
R119/219	50515470	6.8k			
R120/220	50515490	10k			
R121/221	50515220	100			
R122/222	50515780	1M			
R123/223	50515730	470k			
R124/224	50515510	15k			
R125/225	50515480	8.2k			
R126/226	50515440	4.7k			
R127/227	50515480	8.2k			
R128/228	50515570	33k			
R129/229	50515490	10k			
R130/230	50515680	220k			
R131/231	50515730	470k			
R132/232	50515170	47			
R133/233	50515400	2.7k			
R134/234	50515090	10			

PARTS LIST

CIRCUIT REF.NO.	TEAC PARTS NO.	DESCRIPTION	1st	2nd	3rd
R135/235	50515340	1k			
R136/236	50515510	15k			
R137/237	50515700	270k			
R138/238	50515700	270k			
R139/239	50515620	68k			
R140/240	50515490	10k			
R141/241	50515540	22k			
R501	50515220	100			
R502	50515260	220			
R503	50515030	3.3			
		CAPACITORS			
		ALL CAPACITORS IN MICRO FARADS UNLESS OTHERWISE NOTED.			
C101/201	50554050	Elec. 10 16V			
C102/202	50548120	Mylar 0.0015 50V			
C103/203	50548120	Mylar 0.0015 50V			
C104/204	50549420	Mylar 0.0027 50V			
C105/205	50554050	Elec. 10 16V			
C106/206	50554050	Elec. 10 16V			
C107/207	50554050	Elec. 10 16V			
C108/208	50554050	Elec. 10 16V			
C109/209	50548260	Mylar 0.0056 50V			
C110/210	50548330	Mylar 0.027 50V			
C111/211	50548130	Mylar 0.0047 50V			
C112/212	50554050	Elec. 10 16V			
C113/213	50548520	Mylar 0.1 50V			
C114/214	50554010	Elec. 47 10V			
C115/215	50546160	Aluminum 0.47 16V'			
C116/216	50548520	Mylar 0.1 50V			
C117/217	50548520	Mylar 0.1 50V			
C118/218	50554050	Elec. 10 16V			
C119/219	50549130	Aluminum 0.33 6.3V			
C120/220	50548520	Mylar 0.1 50V			
C501	50554400	Elec. 470 16V			
C502	50554400	Elec. 470 16V			
C503	50554960	Elec. 330 25V			
		MISCELLANEOUS			
Se501	50422260	Silicon Stack SIB-02C			
F101	50412160	Fuse Holder 125V 1A			
Fuse 101	50411130	Fuse 0.5A			

PARTS LIST

OSCILLATOR ASSY

CIRCUIT REF.NO.	TEAC PARTS NO.	DESCRIPTION	1st	2nd	3rd
	50489741	PC Board Assy, Oscillator			
	50482120	PC Board, Oscillator			
Q401	50423660	Transistor 2SC732BL			
D401	50422350	Zener Diode RD-6A			
VR401	50533540	Trimmer Resistor 15kΩ B			
R401	50515540	Resistor, Carbon 22kΩ 1/4W			
R402	50515540	Resistor, Carbon 22kΩ 1/4W			
R403	50515540	Resistor, Carbon 22kΩ 1/4W			
R404	50515340	Resistor, Carbon 1kΩ 1/4W			
R405	50515630	Resistor, Carbon 82kΩ 1/4W			
R406	50515460	Resistor, Carbon 5.6kΩ 1/4W			
R407	50515590	Resistor, Carbon 47kΩ 1/4W			
R408	50515480	Resistor, Carbon 8.2kΩ 1/4W			
R409	50515460	Resistor, Carbon 5.6kΩ 1/4W			
C401	50549460	Cap., Mylar 0.01μF 50V			
C402	50549460	Cap., Mylar 0.01μF 50V			
C403	50548420	Cap., Mylar 0.015μF 50V			
C404	50554050	Cap., Elec. 10μF 16V			
C405	50554050	Cap., Elec. 10μF 16V			
C406	50554030	Cap., Elec. 47μF 6.3V			